

REMARKS

Claims 1-16 and 22 are pending. By this Amendment, claims 1-8, 11 and 14 are cancelled without prejudice or disclaimer, claim 22 is amended and new claims 23-31 are added.

Applicant thanks the Examiner for the telephonic interview of June 29, 2007. Applicant submits that the substance of the interview consisted of a discussion of U.S. Patent No. 6,398,883 to Forrest, et. al. relative to claim 1.

Claim Rejections Under 35 U.S.C. § 102

Claim 1-4, 6-16, and 22 were rejected as anticipated by Forrest et. al. '883. Applicant respectfully traverses this rejection.

In embodiments of the claimed invention, friction stir welding is employed as a preparatory treatment for metal work-pieces to be joined by welding. According to the claimed method, portions of each work-piece are friction stir welded, thereby creating a region extending into each work-piece wherein the grain of the metal is refined relative to the portions of the work-piece outside the region. The friction stir welded portions of the two work-pieces are then abutted to each other and fusion welded together. The material melted in the fusion welding process extends into each work-piece by a distance less than the distance the friction stir welded portion extends into the work-piece, thereby defining a structure wherein a remaining portion of the friction stir welded region is sandwiched between the material melted in the fusion welding process and the portions of the work-piece outside the friction stir welded region. Advantageously, by reducing or eliminating liquation cracking, the method of the claimed invention may be used to join work-pieces having a least cross sectional dimension of 50mm or greater.

In contrast with the claimed invention, Forrest et. al. '883 is concerned with reducing stress cracking proximate threaded openings that are machined in a work-piece or in other high

stress regions. See e.g. col. 1, ll 25-38; col. 2, ll. 12-23. Applicant submits there is no teaching or suggestion in Forrest et. al. '883 of friction stir welding as a preparatory step before fusion welding as in the claimed invention. Although the Examiner cites to col. 5, ll. 41-47, and Figure 16 of Forrest et. al. '883 for a teaching of welding together members that have been previously friction stir welded, these passages are very general and simply describe using structural members that have been friction stir welded in a larger structural assembly. There is no specific teaching or suggestion in any of these passages of fusion welding together work-pieces at friction stir weld prepared regions, let alone wherein the friction stir welded regions extend into each work-piece a distance greater than the distance that the fusion weld extends into the work-piece as in the claimed invention. Consequently, Forrest et. al. '883 cannot anticipate or render the invention of claims 1, 9, 10, and 22 obvious.

Further, regarding claims 2 and 22, on page 2 of the Office Action, the Examiner points to disclosure in Forrest et. al. '883 of grain refinement extending to a depth of "about 6.5mm." Applicant respectfully notes that 6.5mm is not "at least 10mm" as claimed in claims 2 and 22. In that Forrest et. al. '883 does not teach or suggest all features of the invention of claims 2 and 22, it cannot anticipate or render them obvious.

Although Applicant respectfully traverses this rejection as set forth, Applicant has made certain claim amendments and cancellations and has added new claims to further clarify the claimed invention. These amendments, cancellations and additions are made solely for the purpose of advancing prosecution, and are not to be taken as a waiver or disclaimer of subject matter or as acquiescence in the positions of the Office expressed in Office Actions in the present case.

In particular, claims 1-8, 11 and 14 are cancelled without prejudice or disclaimer, thereby mooting the rejection thereof. Claims 23-31 are added. Independent claim 23 recites a method of joining two metal work-pieces comprising providing two metal work-pieces, each work-piece

presenting at least one face defining a plane, and preparing the work-pieces by applying a friction stir welding process on the face of each work-piece. The friction stir welding process defines a treated region extending a first distance into the work-piece from the plane of the face. The work-pieces are then arranged so that the face of one work-piece abuts the face of the other work-piece at a butt joint. Then, the two work-pieces are welded together at the butt joint with a fusion welding process wherein a portion of the treated region of each work-piece is melted thereby defining a melted region extending into each work-piece a second distance from the plane of the face, and wherein the first distance is greater than the second distance so that a remaining portion of the treated region of each work-piece is sandwiched between the melted region and the portion of the work-piece outside the treated region. Applicant respectfully submits, in that Forrest et. al. '883, does not teach or suggest fusion welding together work-pieces at friction stir weld prepared regions at all, let alone wherein the friction stir welded regions extend into each work-piece a distance greater than the distance that the fusion weld extends into the work-piece as claimed, new claim 23 is distinguished over Forrest et. al. '883. Moreover, claims 24-31 are distinguishable as dependent claims incorporating all limitations of claim 23 which is allowable as set forth above.

Further, claim 22 has been amended to clarify that the material melted in the fusion welding process extends into each work-piece by a distance less than the distance the friction stir welded region extends into the work-piece. Claim 22 is thus distinguishable over Forrest et. al. '883 for the reasons set forth above.


Claim Rejections Under 35 U.S.C. § 103

Claim 5 was rejected as obvious over Forrest et. al. '883 in view of Bronson et. al. '824. Although claim 5 has been canceled without prejudice, the subject matter of claim 5 is incorporated in new claim 27. Applicant respectfully submits in that independent claim 23 is novel and unobvious as set forth above, dependent claim 27 is novel and unobvious by virtue of its dependency.

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Bradley J. Thorson', written over the printed name.

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